



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: GU1321

Title: Investigation of the Use of Locally Available Materials for Slow Sand Filtration In Kosrae State, Federated States of Micronesia

Focus Categories: Treatment, Surface Water

Keywords: Streams, Water Quality Control, Slow Sand Filter

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Abstract

Surface water is widely used throughout the high islands of the Federated States of Micronesia (FSM) and particularly in Kosrae as a major source of drinking water. In all cases this water is heavily contaminated and unfit for human consumption without treatment. Intense tropical storms and high erosion rates combined cause large fluctuations in the levels of turbidity in the surface water supplies. The turbidity of runoff from the streams that feed the Tofol-Lelu systems in Kosrae ranges from 1.6 to 14 NTU's. Presently the water is diverted directly from a stream bypassing the non-functioning existing treatment plant and is delivered untreated to the population. A previous project has established the feasibility of using local materials for filters media. Further studies are required to determine the upper limit of loading rates. The rates are needed to determine the economic feasibility of using locally available materials.

The primary goal of this project is to develop recommendations and design criteria for the use of locally available manufactured sand for the application of slow sand filtration technology to improve the quality of the surface water supplies of Kosrae and the other islands of FSM. To accomplish the goal, four existing slow sand pilot plants will be tested by using local sand with the following configuration:

1. Four filters each with the same sand bed size distribution will be tested, each with different flow rate, for a period of four month.
2. The filter bed size distribution of the sand for filters will be changed and tested using the same flow rates as above for a period of four months.

The results will be evaluated based on: 1) the ability of the plant to remove coliform bacteria at a removal rate of 90-99%, 2) the ability to reduce turbidity of less than 1 NTU, and 3) the time interval between the required scraping of the top part of the bed media.

The monitoring and testing of the plants will be accomplished by daily measurement of inflow and outflow, temperature, turbidity, head loss across the bed filters, and coliform levels reduction for the entire four month of each run. Two spiking tests will be performed on all four filters at the start of each run. The spiking tests will confirm the coliform bacteria removal rates.